



UNIVAC

9400 - Data Communications Subsystem Command and Serial Test
R8575A

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1. INTRODUCTION

1.1 Purpose - This document describes the 9400 Maintenance Test Program for the Data Communications Subsystem (DCS). *R9575A*

1.2 Major Objectives - This program is designed to test Types 1, 4, 4A, and 16 of the Data Communications Subsystem. It is intended to assist Field Engineering and Quality Control personnel in verifying and maintaining DCS.

1.3 Equipment Configuration - The DCS is connected to the Multiplexer (MPX) I/O Channel of the 9400 Processor. It uses any or all of the following equipment:

- Kind 1 - Low Speed Line Terminal (LT-L) F1003-00,01,02,03,06,07
- Kind 2 - Medium Speed Line Terminal (LT-M) F1004-00,01,02,03
- Kind 3 - Synchronous Line Terminal (LT-S) F1005-00,01,02,03,04,05
- Kind 4 - Parallel Line Terminal (LT-P) F1006-01
- Feature 14 - Dialing Adapter (DA) F1007-00

1.4 Associated Software - This program relies on the Maintenance Control Routine (MCR) to perform message handling and program loading, parameterization, execution, and deletion.

1.5 Reference Documents - The following documents contain information relevant to the operation of this test program:

<u>Drawing</u>	<u>Revision</u>	<u>Description</u>
S-70040	A	9400 Processor Product Description
S-90037	C	Data Communication Subsystem Product Description
603-3		Tech Memo - DCS-1; LT-S; CI; LRC
603-4B		Tech Memo - DCS Line Terminal, Low Speed
603-5		Tech Memo - LTS
603-6		Tech Memo - Dialing Adapter
603-10A		Tech Memo - DCS Line Terminal, Low Speed
603-12		Tech Memo - Medium Speed Line Terminal
603-15		Tech Memo - DCS Line Terminal, Low Speed
603-16		Tech Memo - Medium Speed Line Terminal
603-17		Tech Memo - LT-P; CI
603-18		Tech Memo - LT-S
4091622		9400 Maintenance Control Routine Program Description Drawing
4091623		9400 Parameter and Message Routine Program Description Drawing
4091647		9400/CS8575 Data Communications Subsystem Test Program Description Drawing

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<u>Drawing</u>	<u>Revision</u>	<u>Description</u>
4096482		Documentation Standard for Engineering Program Publications
4096483		General Parameter and Message Standard for Test Programs
4096484		9400 Maintenance Systems Guideline

1.6 Restrictions -

- Matching input and output line-terminals must have the same bit length configuration.
- Because of the real-time nature of the program, the Resume Action Designator is not available.
- A D^o parameter entry deletes all devices and all options except for V1 and clears all device tables. Before the program can be run again, devices must be added via the Add Action Designator.
- When Test 3 (Send Break Test) is selected, only those Low Speed Line Terminals (F1003-067) of the kind K1 (low speed LT's) may be run.
- When Test 15 (New Sync Test) is selected, only those Synchronous Line Terminals which incorporate the New Sync option for the kind K3 (Synchronous LT's) may be run.

2. FUNCTIONAL DESCRIPTION

2.1 Program Philosophy - This MAR is composed of eight subtests, two data tests and six command tests. The data tests transfer (both input and output) data blocks and then make various sense and status checks to ensure a proper data transfer. The command tests issue both legal and illegal command sequences and check for the proper execution of these commands by the DCS. The MAR is divided into eight major sections (PARAMETER, INITIALIZE, DEVICE SELECTION, TEST SELECTION, COMMAND, INTERRUPT, DATA GENERATION, and DATA CHECKING) as shown in Figure 1 of Section Four.

The Parameter Section of this MAR contains the parameter analysis routine. All parameter entries are checked for validity and then either placed in the parameter table or rejected. The View Designator (V:#Ann®) will cause the contents of a specified device table to be displayed on the console.

Program initialization is handled by the Initialize Section. It biases addresses within parameter packets and STXIT Packet addresses and then waits for parameters to be entered.

The Device Selection Routine determines which devices are to be activated by scanning the device tables until one is found which has been readied by the Parameter Section. After all devices have been checked and the selected devices activated, the program recycles to the first device table. A diagram of a device table is shown in Figure 2 of Section Four.

After a device has been selected, the Test Section evaluates the subtests which have been selected for that device. If they are legal for that device, they are enabled for testing; if they are not legal, they are ignored.

The Command Section is the actual command portion of the program. The normal chain of operations begins with commands which enable testing on the selected line terminals, and then proceeds as follows: command sequences are issued, status is checked, sense commands are issued, expected sense bytes are calculated, and expected and actual sense bytes are compared. Any detected errors result in the printing of an appropriate error message. A command table is provided for each command issued in a command test sequence. Figure 3 of Section Four shows how this table is set up and what it contains.

Interrupts are handled by the Interrupt Section which contains routines to check the interrupt cue and timed-out devices (inactive or erring line terminal pairs) and to update the cue when a line terminal pair has been fully tested.

The Data Generation Section contains data output routines for each of the four different types of devices tested. The devices are described in Paragraph 1.3. These data routines perform a variety of functions such as issuing commands which enable testing on the selected line terminals, checking status information and issuing sense commands where necessary, compiling properly selected data buffers (as described in Figures 4, 5, and 6), calculating output and input byte counts, and setting up the proper buffer and status control words.

Each of the four types of devices has an input routine associated with it which checks the incoming data for accuracy. These routines are contained in the Data Checking Section of this MAR. The routines check ending status information, process interrupts found in the cue, and verify the contents of the input data buffer.

2.2 Subtest Descriptions - Each of the following subtests is described by stating its objective and the method used to attain it.

2.2.1 Subtest 1 - (Group Test)

Objective - To enable several subtest to be selected by simply entering T1.

Method - When this subtest is selected, Subtests (2, 10, 11, 12, 13, 14) are activated in the MAR's parameter table. Subtests 12 and 13 are executed if feature 14 is enabled for any given pair of LT's. Only those tests which are legal for any given kind will be executed.

2.2.2 Subtest 2 - (Command Test)

Objective - This subtest is designed to check the capability of the DCS to properly execute a variety of commands.

Method - A command is issued and then a check is made for the proper postexecution status. If the expected status is received, the next command is issued. But if the status is not as expected, an error message is printed before the next command is issued. The command sequence is defined as follows:

<u>COMMAND</u>	<u>SUBTEST ELEMENT</u>
Turn-Off, Input	2/1
Turn-Off Output	2/2
End Test, Input	2/3
DCS Test, Input	2/4
Turn-On, Input	2/5
Send Data, Output	2/6
Test I/O, Input Inactive	2/7
Test I/O, Output Inactive	2/8
Undefined Command, Input	2/9
Undefined Command, Output	2/10
Sense, Input Inactive	2/11
Sense, Output Inactive	2/12
Send Data, Input	2/13
Turn-On, Output	2/14
DCS test, Output	2/15
Dial, Input	2/16
Local Test, Output	2/17
End Test, Output	2/18
Look-for-Sync, Output	2/19
Disconnect, Output	2/20
Send Break, Input	2/21
Repeat Turn-On, Input	2/22
Repeat Send Data, Output	2/23

2.2.3 Subtest 3 - (Send Break Test)

Objective - This subtest is designed to check the capability of the DCS to properly execute the Send Break Command. This command is available on F1003-06,07 only!

Method - A Turn-On Command is sent during an Initial Selection Sequence and a Status Byte of all-zeros is generated by the line terminal. A Send Break Command is then issued and various sense and status checks are made as indicated in Figure 3 of Section Four. Any unexpected sense or status information will cause an error printout. The command sequence is defined as follows:

<u>COMMAND</u>	<u>SUBTEST/ELEMENT</u>
Turn-On, Output	3/1
Send Break, Output	3/2

2.2.4 Subtest 10 - (D1-3 Data Test)

Objective - This subtest is designed to check the data transferring capability of the line terminals serially, one pair at a time. The DCS Concurrent Test (Drawing Number 4091647) can operate a maximum of 64 pairs of I/O terminals concurrently and should be used if a more realistic test is desired.

Method - The selected line terminal must be placed in the back-to-back mode of operation before this test is run. Data may be transferred and received at either the line terminal level or the modem level. Any errors detected in the data transfer will cause the appropriate error printouts. The command sequence used in this subtest is defined as follows:

<u>COMMAND</u>	<u>SUBTEST/ELEMENT</u>
Turn-on, Input	10/1
Send Data, Output	10/2

2.2.5 Subtest 11 - Parallel Data Test

Objective - This subtest is designed to check the data handling capability of the Parallel Line Terminal.

Method - Data is transferred in parallel (8 bits at a time) in a predefined data pattern. The data buffer is transferred and checked for accuracy. Various sense and status checks are made as indicated in Figure 3 of Section Four. Any data errors or unexpected sense or status information will cause error printouts. The command sequence is defined as follows:

<u>COMMAND</u>	<u>SUBTEST/ELEMENT</u>
Turn On, Input	11/1
Parallel Test, Input	11/2

2.2.6 Subtest 12 - (Good Dial Test)

Objective - This subtest is designed to check the ability of the DCS to properly execute a legal Dial Command.

Method - A Turn-On Command is sent during an Initial Selection Sequence and a Status Byte of all zeros is generated by the line terminal. A legal Dial Command is then issued and various sense and status checks are made as indicated in

Figure 3 of Section Four. Any unexpected sense or status information will cause an error printout. The command sequence is defined as follows:

<u>COMMAND</u>	<u>SUBTEST/ELEMENT</u>
Turn-On Input	12/1
Dial, Output	12/2

2.2.7 Subtest 13 - (Bad Dial Test)

Objective - This subtest is designed to check the capability of the DCS to reject an illegal Dial Command.

Method - A Turn-On Command is sent during an Initial Selection Sequence and a Status Byte of all zeros is generated by the line terminal. An illegal Dial Command is then issued and various sense and status checks are made which should indicate that the command is illegal. The appropriate error message will be printed. The command sequence is defined as follows:

<u>COMMAND</u>	<u>SEQUENCE/ELEMENT</u>
Turn-On, Input	13/1
Dial, Output	13/2

2.2.8 Subtest 14 - (Look-For-Sync Command Test)

Objective - This subtest is designed to check the capability of the DCS to properly execute the Look-For-Sync Command.

Method - The Look-For-Sync Command prepares the Input LT for data transfer (A detailed description of this command can be found in the DCS Equipment Specification, Number SA 00798). The Send Data Command is issued during an Initial Selection Sequence which starts the output data transfer and caused the LT to generate an all-zeros Status Byte as a response. Various sense and status checks are made after each command as indicated in Figure 3 of Section Four. Any unexpected sense or status information will cause an error printout. The command sequence is defined as follows:

<u>COMMAND</u>	<u>SUBTEST/ELEMENT</u>
Look-For-Sync, Input	14/1
Send Data, Output	14/2

2.2.9 Subtest 15 - (New Sync Command Test) - Option on all Synchronous LT's

Objective - This subtest is designed to check the capability of the DCS to properly execute the New Sync Command.

Method - The three commands shown below are sent, the New Sync Command prior to, and the Turn-On and Send Data Commands during an Initial Selection Sequence. Various sense and status checks are made after each command as indicated in Figure 3 of Section Four. Any unexpected sense or status information will cause an error printout. The command sequence is defined as follows:

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<u>COMMAND</u>	<u>SUBTEST/ELEMENT</u>
New Sync, Input	15/1
Turn-On, Input	15/2
Send Data, Output	15/3

3. OPERATING PROCEDURES - This section describes the parameters and messages associated with the DCS test program. Operating procedures common to all peripheral subsystem test programs are described in the MCR and PMR documents listed in Paragraph 1.5.

3.1 Initialization - The pre-test setup consists of the following:

- Load the Maintenance Control Routine (MCR).
- Manually place the devices (where required) in a back-to-back mode.

3.2 Program Loading - The procedure for loading the program is as follows:

- Press the ATTENTION key. The console responds with the @ sign, a time stamp, and a space. It then waits for an input message.
- Type in "RU". The console responds by printing an "N" adjacent to the "RU" followed by a space.
- Type in the program name as follows:

R8575A

- Press the EOM key (symbol @). The load and run statement appears on the console as:

@ 00:00 RUN R8 75A@

- When the program has been loaded, the MCR prints a message which indicates the job number of the program and the starting address of the test program.

JOB 1, R8575A LOADED AT 02A48

3.3 Program Starting - The program is started by the MCR as soon as it is loaded. When the program is started, it types out the message:

*A 00:16 1 R8575A ENTER PARAMETERS

and waits for the operator to enter parameters. Parameters are entered in the format described in Paragraph 3.4.1 using the procedure outlined in Paragraph 3.4.

3.4 Program Modifying - The program may be modified to operate a specific configuration in various operating modes by entering unsolicited parameters.

The parameter entry procedure is as follows:

- Press the ATTENTION key. The console responds with an @ sign and a time stamp (such as, @02:27) and waits for the operator to enter a run number.
- Type in the 1-digit job or run number and a comma. The job number must be entered within two minutes after the ATTENTION key was pressed or an abort timeout will occur. An example of an entry statement to this point is:

@02:27 1,

- Enter up to 63 characters of parameter data, ending the statement by pressing the EOM key. An operator must enter all data following the comma within two minutes or an abort message will be printed. An example entry statement is:

@00:39 1,A T1 V6/5:#A00,2 K3 F1/5@

- Enter the needed parameters, then begin the program by entering a Begin Action Designator. The Begin Designator may be entered either as a separate statement or as a separate sentence in a parameter entry statement. Examples are shown below.

@00:42 1,B@ (begin all entered devices)

@00:42 1,B:#A40@ (begin devices 40 and 41)

@00:42 1,A T1 V6/5:#A00,2 K3 F1/5.B@ (begin devices 0, 1, 2, and 3)

3.4.1 .Parameter Entries - Parameters are entered in a statement in the following general format:

d Tn Vn/y:#Ann Kn Fn/y@

Where:

- d = An Action Designator
- Tn = A number or group of numbers indicating what tests are to apply to the subsystem.
- Vn = Program options to be employed.
- /y = An extension which applies to V5 and V6. For V5 y specifies the operator buffer size. In V6 it designates the operator-specified data which will be stored in the output buffers. If V6 is not specified, random data is generated.
- # = Signals the PMR that a three-character device address follows.
- Ann = A three-character device address consisting of, in order, an alpha character (arbitrarily selected EBCDIC) which designates the subsystem's control unit, and two hexadecimal numbers (00-7F) which identify the device to be tested.
- Kn = A number (1-4) which identifies the kind of device being tested.
- Fn = A number (1-14) which identifies the features being used on the specified device.
- Fn/y = An extension which applies to the indicated feature. Paragraph 3.8.2 contains a detailed description of these extensions.
- @ = End-of-Message symbol.

3.4.2 Parameter Notes and Restrictions -

1. Entering D@ (Delete) will delete all devices entered. An example is:

@00:50 1,D@

2. To delete specific devices, only the devices to be deleted need to be entered. Deleting an output device means the automatic deletion of its matching input device, and vice versa. Examples are:

@00:50 1,D:#A40,41@ (deletes Devices 40 and 41)

@00:50 1,D:#A40@ (deletes Devices 40 and 41)

~~000~~:50 1,D:#A41~~0~~ (deletes Devices 40 and 41)
~~000~~:50 1,D:#A40-46~~0~~ (deletes Devices 40 through 47)
~~000~~:50 1,D:#1 10-47~~0~~ (deletes Devices 40 through 47)

Other entries (Variables, Tests, Kinds, and Features) are ignored.

3. The View Designator is illegal unless it is applied to a specific device designator.

Example: V~~0~~ (illegal)
 V:#Ann~~0~~ (legal)

4. To suspend specific devices, only the devices to be suspended need to be entered. Suspending an output device automatically suspends its matching input device, and vice versa. Examples are:

~~000~~:50 1,E:#A40,41~~0~~ (suspends Devices 40 and 41)
~~000~~:50 1,E:#A40~~0~~ (suspends Devices 40 and 41)
~~000~~:50 1,E:#A41~~0~~ (suspends Devices 40 and 41)
~~000~~:50 1,E:#A40-46~~0~~ (suspends Devices 40 through 47)
~~000~~:50 1,E:#A40-47~~0~~ (suspends Devices 40 through 47)

Other entries (Variables, Tests, Kinds and Features) are ignored.

5. If a parameter entry is made when a device is active, the device will be suspended and must be begun again. This applies only to feature (F) and kind (K) entries.
6. A delete statement cancels a device and clears its device table. The device can be reactivated only by adding it again. An end statement suspends a device but its device table is not cleared. The device may be reactivated by using a Begin Designator. Examples are:

~~000~~:50 1,D:#A40~~0~~ (deletes Devices 40 and 41)
~~000~~:50 1,A Tn Vn/y:#A40 Kn Fn/y.B~~0~~ (reactivates Devices 40 and 41)
~~000~~:50 1,E:#A40~~0~~ (suspends Devices 40 and 41)
~~000~~:50 1,B:#A40~~0~~ (reactivates Devices 40 and 41)

7. A colon (:) is used to separate the controller and device fields in a parameter sentence.
8. A semicolon (;) is used to separate different kinds and associated features having the same controller field. For example:

~~000~~:50 1,A T1 V6/52:#A40 K3 F1,2,4;#A50 K2 F3,4,5~~0~~

9. A period (.) is used to separate parameter sentences. For example:

~~000~~:50 1,A T1 V6/52:#A40 K3 F1,D:#A30~~0~~

10. Entering B~~0~~ (Begin) will activate all devices previously selected but not activated.

11. A number sign (#) must be entered between the colon and the device address as shown below.

Tn:#Ann

3.5 Program Stopping - The test program can be stopped by one of the following entries.

- Via a parameter entry having the following format:

E⊙

This entry suspends the test program. Message 1 in Paragraph 3.9.3.1 is displayed after all devices are cycled down.

- Via a parameter entry having the following format:

D⊙

This entry suspends the test program and clears all device tables, flags, etc.

3.6 Program Restarting - The test program can be restarted following suspension by the following parameter entry:

B⊙

This entry restarts the test program from its initial starting point.

3.7 Program Termination - The program may be removed from storage by submitting a cancel directive to the Maintenance Control Routine as follows:

1. Press the ATTENTION key. The MCR will type the time and wait for another entry.
2. Type the letters CA; the MCR will respond with the letters NCEL and a space code. The timeout to this point appears as follows:

⊙⊙:5⊙ CANCEL

3. Type the job number and stop code:

⊙⊙:5⊙ CANCEL 1⊙

3.8 Program Designators - The parameter designators recognized by this test program are grouped into the following three categories:

- Action Designators
- Equipment Designators
- Test Designators

3.8.1 Action Designators - The Action Designators specify how the Parameter Analysis Routine of the test program will process the desired parameters. The following Action Designators are recognized by this test program.

- A = Add (directs the MAR to add the following parameters)
- B = Begin (directs the MAR to begin testing at the initial point)
- D = Delete (directs the MAR to delete the following parameters)

- E = Suspend (directs the MAR to suspend the entire test program)
- V = View (directs the MAR to display specified parameters)

Note that the program does not recognize the R(Resume) Action Designator (see Restrictions, Paragraph 1.6).

3.8.2 Equipment Designators - Equipment Designators define the particular DCS device being tested. The following Equipment Designators are recognized by this test program:

- Ann = A three-digit device address specifying controller (EBCDIC) and device (two hexadecimal numbers, 00-7F) to be tested.
- Fn = A number (1-14) indicating what features apply to the equipment, where:
 - F1/n = Bit Length Feature where n defines the bit length.
 - F2/n = Synchronization Character Feature for synchronous line terminals where n defines software sync character.
 - F3/n = Software Output Start-of-Message (SOM) Character Feature where n defines the SOM character.
 - F4/n = Software Output End-of-Transmission (EOT) Character Feature for low-speed line terminals where n defines the EOT character.
 - F5/n = Software Output End-of-Message (EOM) Character Feature where n defines the EOM character.
 - F7 = Pause Feature where a pause character is recognized by the line terminal.
 - F8/n = Longitudinal Redundancy Check (LRC) Feature where LRC is generated by the DCS for various configurations denoted by n:
 - n = 0 means LRC present but not to be verified.
 - = 1 means SOM through EOM generation.
 - = 2 means SOM - last data character and F1005-04/05
 - = 3 means first data character - EOM
 - F9 = Automatic Look-for-Sync (LFS) Feature where a synchronous line terminal automatically "looks" for synchronization after successful completion of the previous transfer or issues a command to permit the Input to "look" for synchronization. EOM recognition must occur in order to maintain automatic LFS.
 - F11 = Software Input Start-of-Message (SOM) Feature is different from that specified in Feature 3.
 - F10 = Local Test Enable enables back-to-back testing through a modem.
 - F12 = Software Input EOM if different from the output or the hardware generated EOM character.
 - F13 = Dialing Adapter Toggle Inhibit Feature. When this feature is set, there is no toggling between the Dialing Adapter Test and the Data test or its associated LT.
 - F14 = Dialing Adapter Present Feature (DA) F1007-00

- K_n = A number (1-4) which specifies the type of equipment used, where:
 - K_1 = Low Speed Line Terminal (LT-L) F1003-00, 01, 02, 03, 06, 07
 - K_2 = Medium Speed Line Terminal (LT-M) F1004-00, 01, 02, 03
 - K_3 = Synchronous Line Terminal (LT-S) F1005-00, 01, 02, 03, 04, 05
 - K_4 = Parallel Line Terminal (LT-P) F1006-01

3.8.3 Program Designators - Program Designators are parameters which modify the program's testing procedures. The following Program Designators are recognized by this MAR:

- T_n = A number or group of numbers which indicate the subtests to be used, where:
 - T_1 = Group Test (2, 10, 11, 12, 13, 14,)
 - T_2 = Command Test
 - T_3 = Send Break Test
 - T_4 = Undefined
 - T_5 = Undefined
 - T_6 = Undefined
 - T_7 = Undefined
 - T_8 = Undefined
 - T_9 = Undefined
 - T_{10} = K1-3 Data Test
 - T_{11} = Parallel Data Test
 - T_{12} = Good Dial Test
 - T_{13} = Bad Dial Test
 - T_{14} = Look-for-Sync Command Test
 - T_{15} = New Sync Command Test
- V_n = A number which indicates the Program Options to be employed, where:
 - V_1 = Allow Error Printouts (available on load)
 - V_4 = Command and Interrupt Trace
 - V_5/y = Buffer Size (6 to 200₁₆ bytes)
 - V_6/y = Operator Specified Data Pattern (y = 2 hexadecimal characters)
 - V_7 = ~~Direct~~ Error Messages to High Speed Printer
 - V_{20} = Enable buffer printout on data error

3.9 Message Descriptions - The following paragraphs define the content and format of the messages associated with this MAR.

3.9.1 General - If the DCS Test Program detects an abnormal condition in the data, commands, hardware status or parameter entries, it informs the operator via a

console message. If V7 was entered and a High Speed Printer is available, the message(s) will be displayed on the printer.

3.9.2 General Format Information - The mnemonics and symbols used in the messages described in Paragraph 3.9.3 are defined in the following paragraphs.

3.9.2.1 Mnemonics -

CC = <u>C</u> urrent <u>C</u> ommand	Q = <u>Q</u> uestion
DPC = <u>D</u> evice <u>P</u> revious <u>C</u> ommand	SB = <u>S</u> ense <u>B</u> yte
CPC = <u>C</u> ontroller <u>P</u> revious <u>C</u> ommand	MB = <u>M</u> onitor Sense <u>B</u> ytes
RECV CC = <u>R</u> eceived <u>C</u> ondition <u>C</u> ode	GB = <u>G</u> ood <u>B</u> yte
CS = <u>C</u> urrent <u>S</u> tatus	BB = <u>B</u> ad <u>B</u> yte
PS = <u>P</u> revious <u>S</u> tatus	TBR = <u>T</u> otal <u>B</u> ytes <u>R</u> eceived
ES = <u>E</u> xpected <u>S</u> tatus	TBB = <u>T</u> otal <u>B</u> ad <u>B</u> ytes
AE = <u>A</u> ddress <u>E</u> xpected	TBE = <u>T</u> otal <u>B</u> ytes <u>E</u> xpected
AR = <u>A</u> ddress <u>R</u> eceived	PN = <u>P</u> attern <u>N</u> umber
D = <u>D</u> eclarative Message	T = <u>T</u> est
I = <u>I</u> mpervative Message	D = <u>D</u> evice
R8575A = Program Name	

3.9.2.2 Symbols - The symbols used in the MAR messages are defined as follows:

hh = hour (00-23)
mm = minute (00-59)
= buffer position of data word or byte
r = run number (1-8)
n or nn = numerical value of mnemonic prefix
Ann = device designator
Tx/xx = Subtest number/subtest element

3.9.3 Messages - All messages originating from the test program fall into three groups: Parameter Error, Subsystem Error, and Information Messages.

3.9.3.1 Parameter Error Messages - Parameter error messages are printed when insufficient or incorrect parameters are detected by the test program. The following is a list of all Parameter Error Messages:

1. Lacks Device

Cause:	The program has no device to test or all devices have been deleted or suspended.
Program Action:	The program prints the following message and waits for the operator to enter parameters.

Example: D hh:mm 1 R8575A LACKS DEVICE

Operator Action: Enter parameters making certain to specify a device.

2. Parameter Format Error

Cause: Parameters were not entered in the correct format.

Program Action: The program prints the following message and waits for a correct parameter entry.

Example: D hh:mm 1 R8575A PARAM FORMAT ERR

Operator Action: Re-enter parameters correctly.

3. Lacks Test

Cause: The program has no test to perform.

Program Action: The program prints the following message and waits for the operator to enter parameters.

Example: D hh:mm 1 R8575A LACKS TEST

Operator Action: Enter parameters making certain to specify T1.

4. No Bit Length

Cause: No bit length was specified in the parameter entry.

Program Action: The program prints the following message and waits for a correct parameter entry.

Example: D hh:mm 1 R8575A NO BIT LENGTH DEVICE #Ann

Operator Action: Re-enter parameters making sure to specify a bit length.

3.9.3.2 Subsystem Error Messages - Subsystem error messages are printed when incorrect status or sense bytes are detected, when unexpected timeout errors occur, or when incorrect data is received. Subsystem error messages are also printed when the number of bytes transferred was incorrect. Subsystem error messages are printed in one of the following formats:

1. Status Error

Cause: A status error has occurred.

Program Action: Program sends a Sense Command to the affected LT only if a Unit Check status indication was returned from the line terminal.

Example: D hh:mm 1 R8575A STATUS ERROR-DEVICE #Ann Tx/xx
CC = n CS = nn ES = nn

2. Sense Error

Cause: The program did not get correct immediate status.

Program Action: The program readies the device for restarting.

Example: D hh:mm 1 R8575A SENSE ERROR-DEVICE #Ann Tx/xx
CC = nn CS = nn ES = nn

3. Unexpected Interruption

Cause: An interruption has occurred from an inactive or non-existent device.

Program Action: The program processes the next interruption in the cue.

Example: D hh:mm 1 R8575A UNEX INTERRUPT DEVICE #Ann
CS = nn Tx/xx

4. Time-out Error

Cause: A device has timed out (i.e. = the time-out word in the device table indicates that operating time for the device has exceeded two minutes).

Program Action: The program clears the Active and I/O Device Flags and checks if the next active device has timed out. The device is also set for re-activation.

Example: D hh:mm 1 R8575A TIMEOUT ERROR DEVICE #Ann Tx/xx

5. Data Error

Cause: Verification of the output and input data buffers indicated a data error.

Program Action: The program reactivates the device.

Example: D hh:mm 1 R8575A #Ann Tx/xx DATA ERROR
GB Ø = nn 1 = nn 2 = nn -----n = nn
BB Ø = nn 1 = nn 2 = nn n = nn
TB = nn

6. Bad Sense Status in Cue

Cause: An interruption other than Device End/Channel End.

Program Action: The cue is updated and the device is re-activated.

Example: D hh:mm 1 R8575A BAD SENSE STATUS IN CUE DEVICE Ann Tx/xx
ES = ØC CS = nn

7. Bad Status in Cue

Cause: A Device End/Channel End status indication was not received as expected.

Program Action: The cue is updated and the device is re-activated.

Example: D hh:mm 1 R8575A BAD STATUS IN CUE-DEVICE #Ann Tx/xx
ES = ØC CS = nn

8. Bad Sense Byte

Cause: Bad sense bytes have been received in response to a command.

Program Action: The cue is updated and the next device is activated.

Example: D hh:mm 1 R8575A BAD SENSE BYTES DEVICE #Ann Tx/xx
ESB = nn CSB = nn

9. Condition Code Error on SIO

Cause: A condition code error has occurred during an SIO (Start I/O) operation.

Program Action: The cue is updated and the next device is activated.

Example: D hh:mm 1 R8575A COND CODE ERROR ON SIO
 COND CODE = nn DEVICE #Ann Tx/xx
 CC = nn CS = nn ES = nn

3.9.3.3 Information Messages - Information messages are printed whenever it becomes necessary for the test program to inform the operator that a condition exists. The following is a list of all information messages:

1. Enter Parameters

Cause: The test program was just loaded by the MCR.

Program Action: The program prints the following message, waits for parameters, and proceeds when it encounters B@.

Example: D hh:mm 1 R8575A ENTER PARAMETERS

Operator Action: Enter parameters for the test program.

2. Sense Bytes

Cause: When a status error occurs, the program sends a Sense Command and prints the sense bytes received.

Program Action: The cue is updated and the device is re-activated.

Example: D hh:mm 1 R8575A SENSE BYTES-DEVICE #Ann Tx/xx
 SB = nnnn

3. Aborted - One at a time, Guys

Cause: Operator has tried to load the program twice without canceling the first load or has attempted to load another real-time program.

Program Action: The second load attempt is ignored.

Example: ABORTED - ONE AT A TIME, GUYS

4. Device Not Available

Cause: A device which was addressed by the program is off-line.

Program Action: The program re-activates the device.

Example: D hh:mm 1 R8575A DEVICE Ann NOT AVAILABLE

5. Command Trace

Cause: Variable 4 has been enabled.

Program Action: The program prints the following message every time a command is issued to the DCS.

Example: D hh:mm 1 R8575A CMD TRACE #Ann
 CC = nn CS = nn ES = nn Tx/xx

6. Interrupt Trace

Cause: Variable 4 has been enabled.

Program Action: The program prints the following message whenever an interrupt is received from the DCS.

Example: D hh:mm 1 R8575A
 INT TRACE = nnnnnnnn PS = nn BCWØ = nnnnnnnn
 BCWI = nnnnnnnn Tx/xx

7. View

Cause: The operator has entered a View Parameter.

Program Action: The program prints out the contents of the device table for the selected device.

Example: D hh:mm 1 R8575A nnnnnnnn nnnnnnnn
 nnnnnnnn nnnnnnnn nnnnnnnn

8. Buffer Dump

Cause: Variable 20 has been enabled.

Program Action: The program prints the entire output and input buffers when a data error is encountered.

Example: I hh:mm 1 R8575A DEVICE #ann buffers
 R8575A OUTPUT BUFFER

nnnnnnnn	nnnnnnnn	nnnnnnnn	nnnnnnnn
nnnnnnnn	nnnnnnnn	nnnnnnnn	nnnnnnnn

R8575A INPUT BUFFER

nnnnnnnn	nnnnnnnn	nnnnnnnn	nnnnnnnn
nnnnnnnn	nnnnnnnn	nnnnnnnn	nnnnnnnn

4. SUPPLEMENTARY INFORMATION

4.1 Supplementary Software Information - This paragraph contains information supplementary to the information in Sections 1 through 3. Figure 1 is a block diagram of the test program. Figure 2 (and Tables 1 and 2) defines the content and format of the device tables. Figures 4, 5, and 6 show the data buffers used by the Data Test.

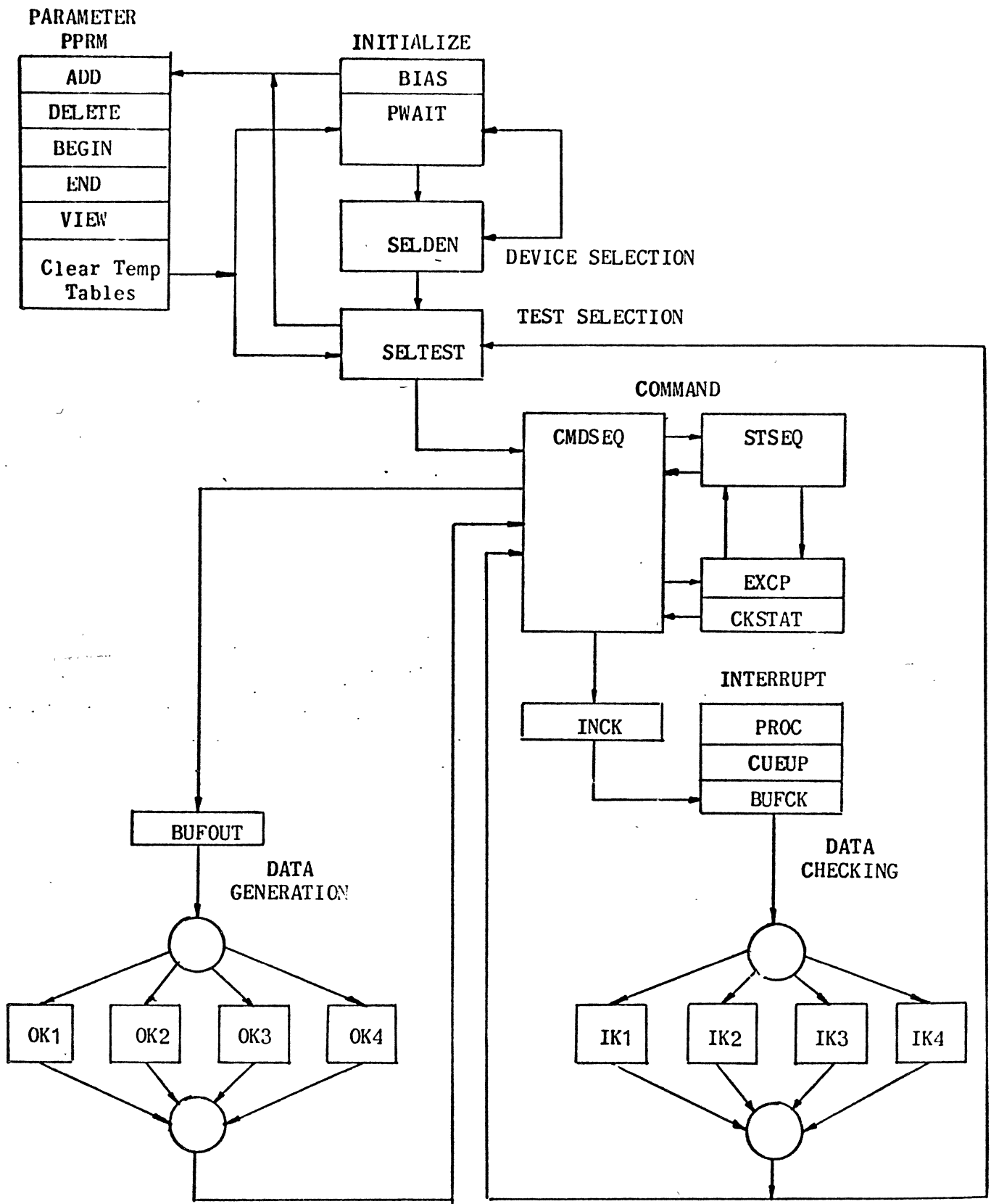


Figure 1. Block Diagram

4.1 Supplementary Software Information (Continued)Byte

0	See Table 1	Output Device No.	F1 Bit Length	F2 Sync
4	F3 Output SOM	F4 EOT	F5 Output EOM	F7 Pause
8	F11 Input SOM	F8 LRC Type	F12 Input EOM	Subtest
12	Buffer Pointer	Kind	See Table 2	
16	Not Used	Controller Alpha	Not Used	Time-out Counter

Figure 2. Device Table

Table 1 - (Byte 0 o Device Table)

BIT	FUNCTION
0	Device Active
1	Device Selected
2	Device Suspended
3	Output Interrupt Received
4	Output Sense
5	Output Sent
6	Input Interrupt Received
7	Input Sense Command Sent

Table 2. Bytes 14 and 15

B Y T E 1 4		
BIT	F _n	FUNCTION
Ø		Used as DA flag for Dialing Adapter
1	F1	F1 Bit Length Enable
2	F2	F2 Software Sync Enable
3	F3	F3 Software Output SOM Enable
4	F4	F4 Software EOT Enable
5	F5	F5 Software Output EOM Enable
6	--	N o t U s e d
7	F7	F7 Pause Generation Inhibit Enable (Random Data)
B Y T E 1 5		
BIT	F _n	FUNCTION
Ø	F8	F8 LRC Type Enable
1	F9	F9 Automatic Look-for-Sync Enable
2	F10	F10 Local Test Enable
3	F11	F11 Software Input SOM Enable
4	F12	F12 Hardware EOM or Software Input EOM
5	F13	F13 Dialing Adapter Toggle Inhibit
6	F14	F14 Dial Adapter Present
7	--	Dialing Adapter Toggle Flag

- The Longitudinal Redundancy Check (LRC) Type Enable (Bit Ø of Byte 15) specifies:

Ø = LRC is present but not to be verified.
 1 = SOM EOM
 2 = SOM DATA
 3 = DATA EOM

- Note that F6 and F9 are not used at this time. In addition, it is necessary to use F10 and F12 only when the input differs from the software-generated output.

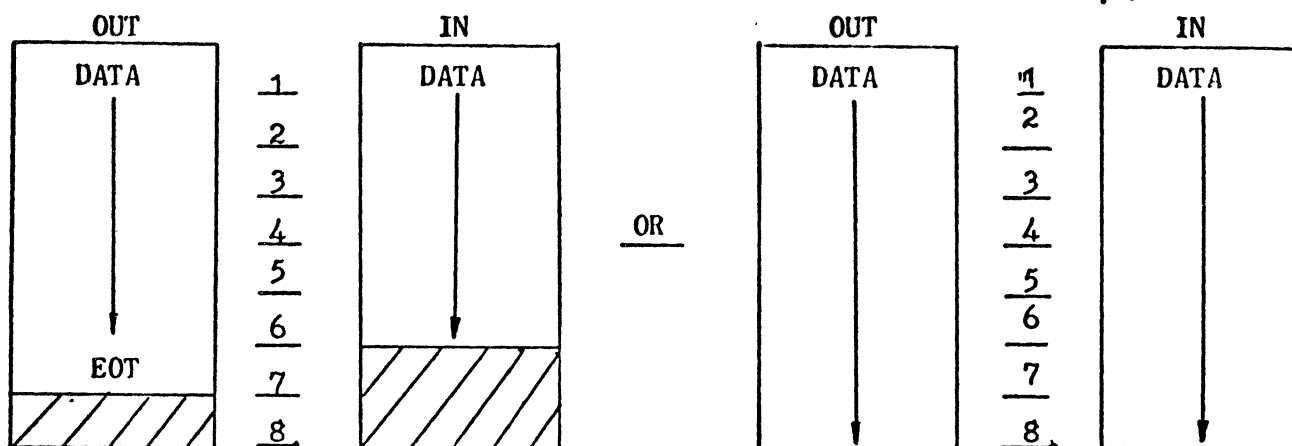
COMMAND	IMMEDIATE STATUS	SENSE BYTES								SENSE BYTES							
EXPECTED STATUS	NOT USED	Ø	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

- Ø = Not used.
- 1 = Not used.
- 2 = Data compare enable.
- 3 = Generate data and data BCWs and SCWs.
- 4 = Sense byte output compare enable.
- 5 = Sense byte input compare enable.
- 6 = Skip this command if previous command was in error.
- 7 = Exit test on error.
- 8 = Interrupt is expected from the command.
- 9 = Input device command.
- 10 = Repeat command twice before looking at status.
- 11 = Exit after command to wait for interrupt.
- 12 = Store sense byte for compare.
- 13 = Terminate BCWs
- 14 = Initialize before command
- 15 = Last command

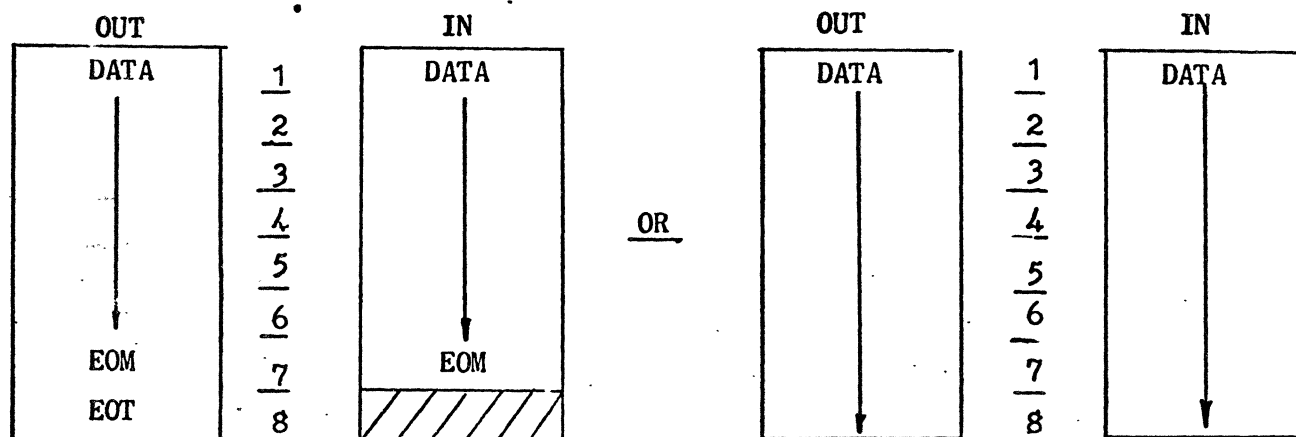
Figure 3. Command Table

4.1 Supplementary Software Information (Continued) -

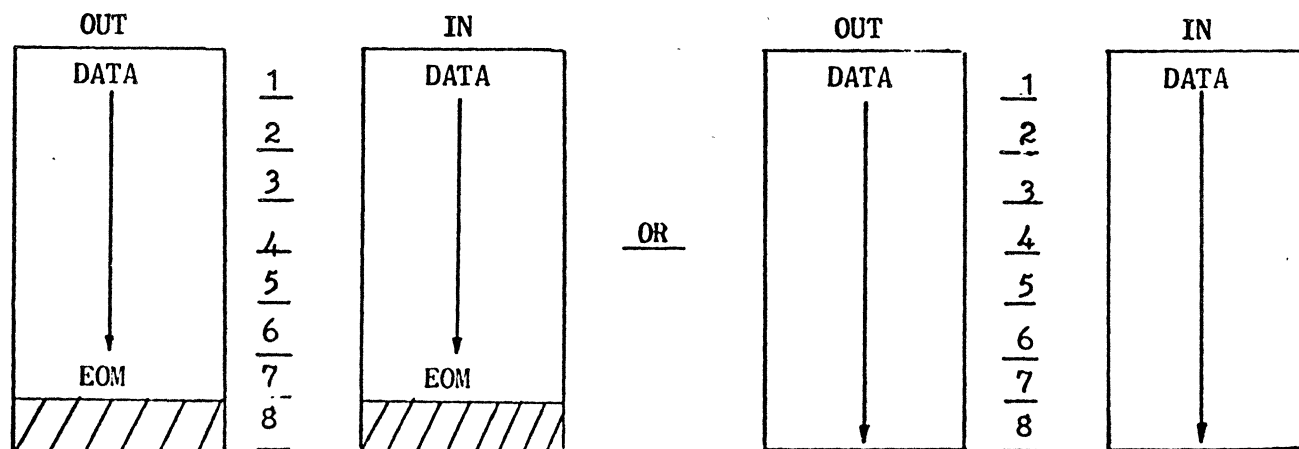
-4091648



F1003-00,01

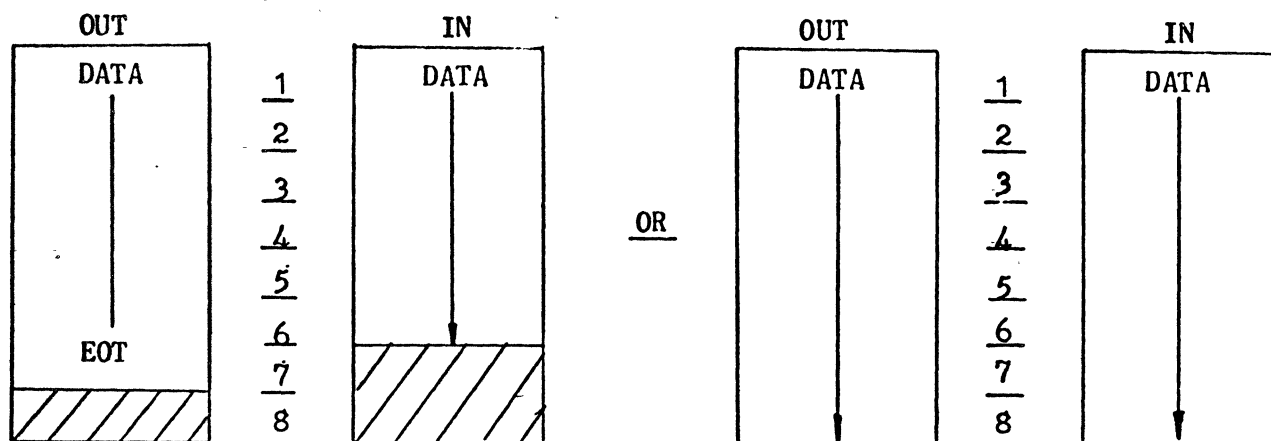


F1003-02,03

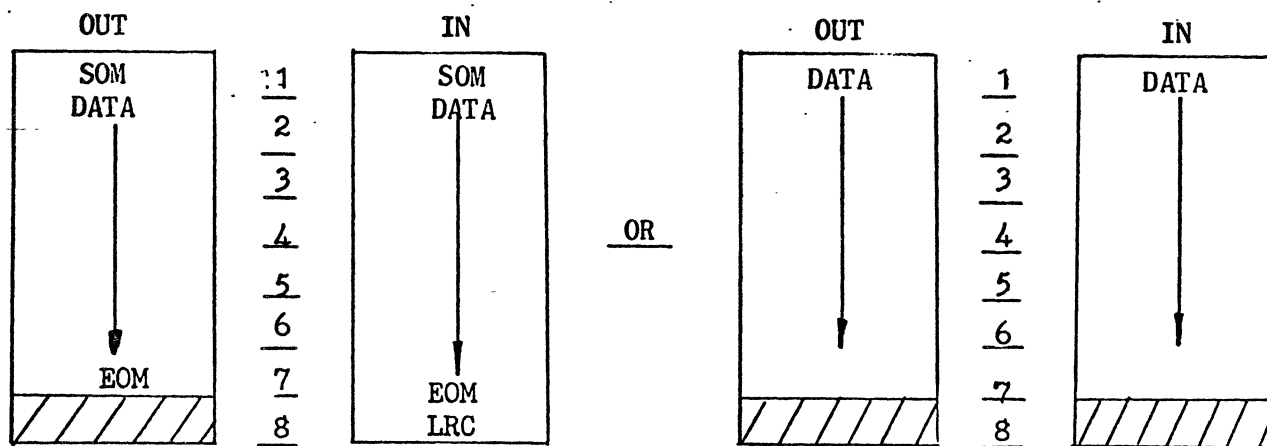


F1003-06,07

Figure 4. Low-Speed LT Data Buffers

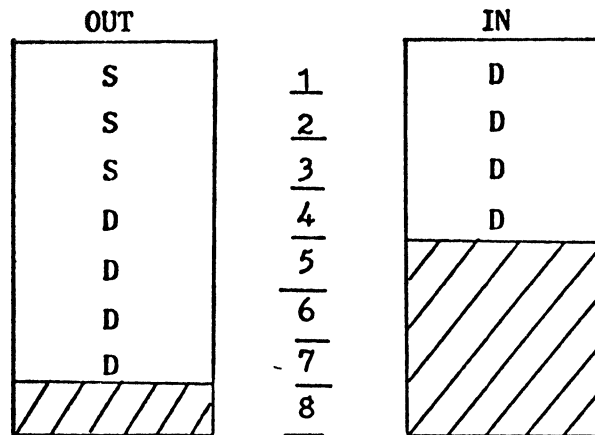


F1004-00,01

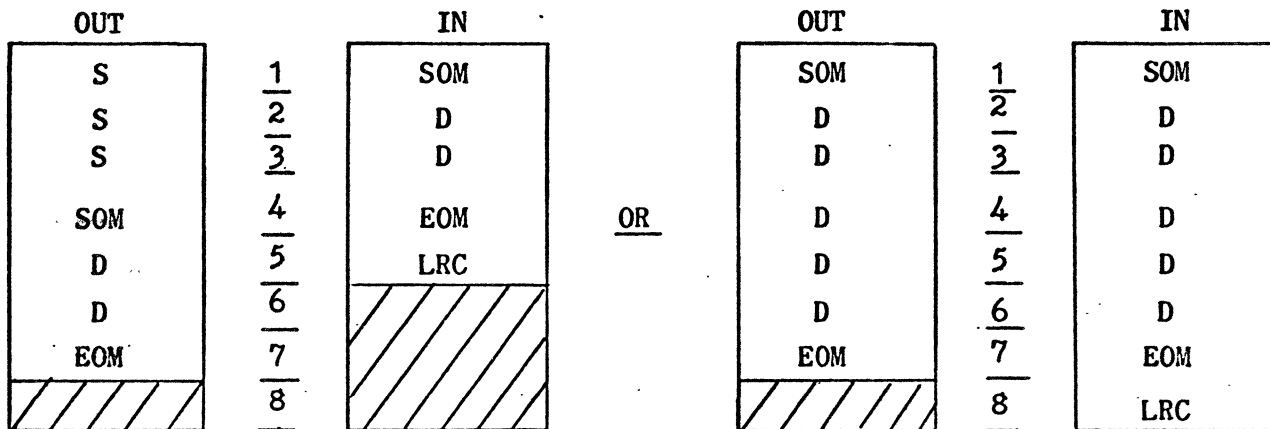


F1004-02,03

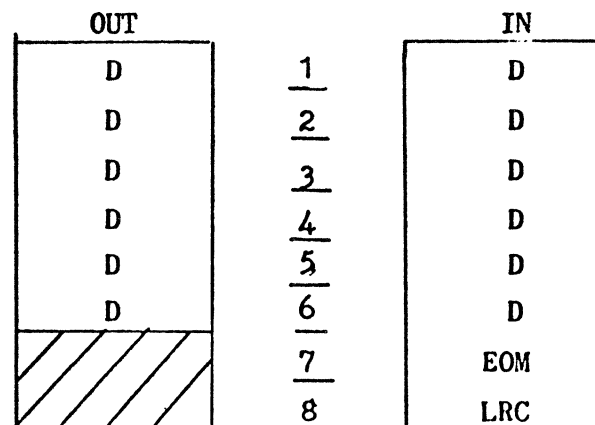
Figure 5. Medium-Speed LT Data Buffers



F1005-00,01



F1005-02,03



F1005-04,05

Figure 6. Synchronous LT Data Buffers

4.2 Supplementary Hardware Information - To be supplied

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